

## SECTION 4.2

## NUMBER #1

4.2.1

Find the determinant using cofactors for  
 $A = \begin{bmatrix} 5 & 2 & 1 \\ 1 & -1 & 4 \\ 3 & 0 & 2 \end{bmatrix}$ . Label and find the cofactors you use.

Solution

Well, let's expand along the 3rd row.  
 So we need cofactors  $a'_{31}$ ,  $a'_{32}$ , and  $a'_{33}$ .

We have

$$a'_{31} = (-1)^{3+1} |A_{31}| = (-1)^4 \begin{vmatrix} 2 & 1 \\ -1 & 4 \end{vmatrix} = + (9) = 9$$

$$a'_{32} = (-1)^{3+2} |A_{32}| = (-1)^5 \begin{vmatrix} 5 & 1 \\ 1 & 4 \end{vmatrix} = - (19) = -19$$

$$a'_{33} = (-1)^{3+3} |A_{33}| = (-1)^6 \begin{vmatrix} 5 & 2 \\ 1 & -1 \end{vmatrix} = + (-7) = -7.$$

So

$$\begin{aligned} \det(A) = |A| &= a_{31} a'_{31} + a_{32} a'_{32} + a_{33} a'_{33} \\ &= (3)(9) + (0)(-19) + (2)(-7) = \boxed{13}. \end{aligned}$$

□